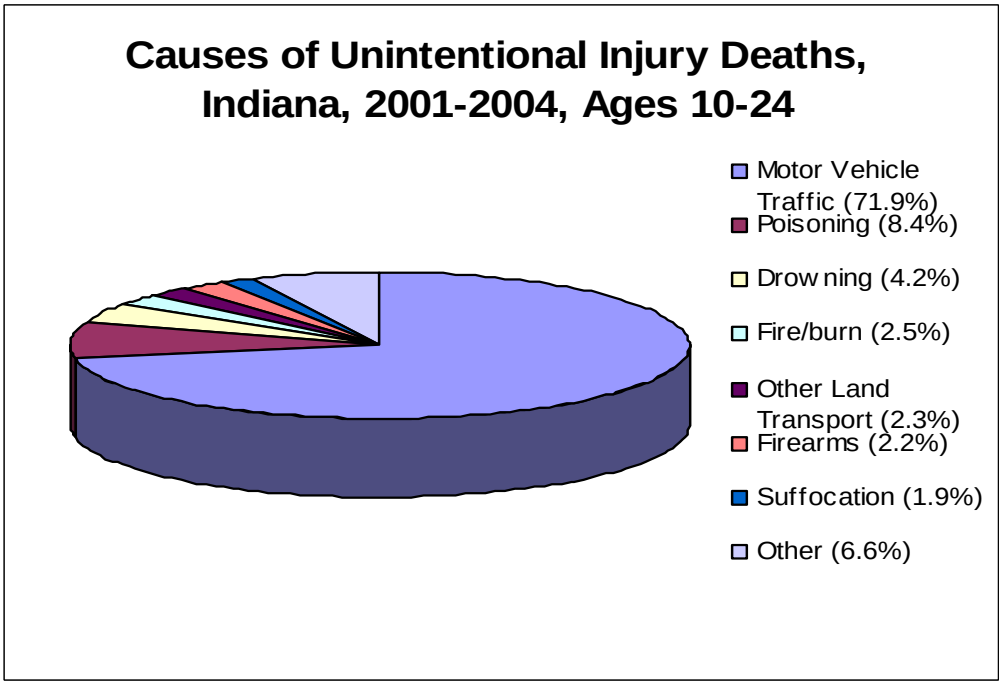
Indiana Motor Vehicle Crashes
Adolescents and Young Adults
Revised April 18, 2007

Mortality

Unintentional injuries were the fifth leading cause of death among Hoosiers between 2001 and 2004 (1). Adolescents and young adults are particularly affected as unintentional injuries were the leading cause of death for ages 10-24 claiming 1,531 lives during that period. The majority of these deaths (71.9% or 1,101) were due to motor vehicle crashes (Figure 1). Those 15 to 19 years of age had the highest percentage (76.4% or 493 of 645) of unintentional deaths due to motor vehicle accident compared to those 10-14 years of age (64.2% or 77 of 120) and 20-24 years of age (69.3% or 531 of 766) although all age categories remain high (1). When comparing years in each age group, all of the age categories had an overall increase in deaths since 2001 (Table 1).

While motor vehicle deaths decreased between 2001 and 2003, deaths increased by 13% between 2003 and 2004 (Figure 2). Ages 10-14 had ICD-10 codes that were unique compared to the other groups, which is expected since children in this age group do not drive (Appendix A). Hoosiers 10-14 years of age were more likely to die as a pedestrian due to a collision with a motor vehicle, as an occupant in a noncollision transport accident, and as a driver of an all-terrain or other off-road vehicle.

Figure 1.



(Source: CDC, WISQARS)

Table 1: Unintentional MV Traffic Deaths and Rates per 100,000, Indiana, 2001-2004, Ages 10-24, All Races, Both Sexes

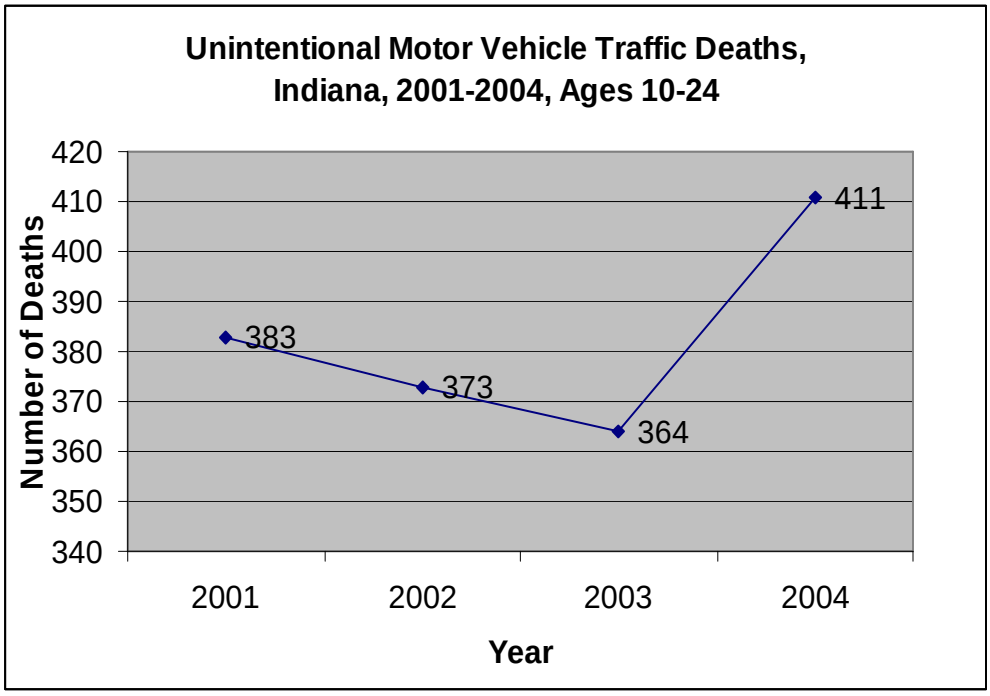
Age Group	Year	Number of Deaths	Population***	Age-Specific Rate
10-14	2001	*	453,891	*
	2002	*	460,569	*
	2003	*	463,282	*
	2004	25	462,987	5.40
		77	**1,840,729**	**4.18**
15-19	2001	121	444,938	27.19
	2002	133	441,566	30.12
	2003	111	442,144	25.10
	2004	128	445,130	28.76
		493	**1,773,778**	**27.79**
20-24	2001	128	449,417	28.48
	2002	125	458,443	27.27
	2003	137	461,357	29.70
	2004	141	455,553	30.95
		531	**1,824,770**	**29.10**
Total		**1,101**	**5,439,277**	**20.24**

(Source: CDC, WISQARS)

*Rates based on 20 or fewer deaths may be unstable. Use with caution.

*** Population estimates are aggregated for multi-year reports to produce rates.

Figure 2.



(Source: CDC, WISQARS)

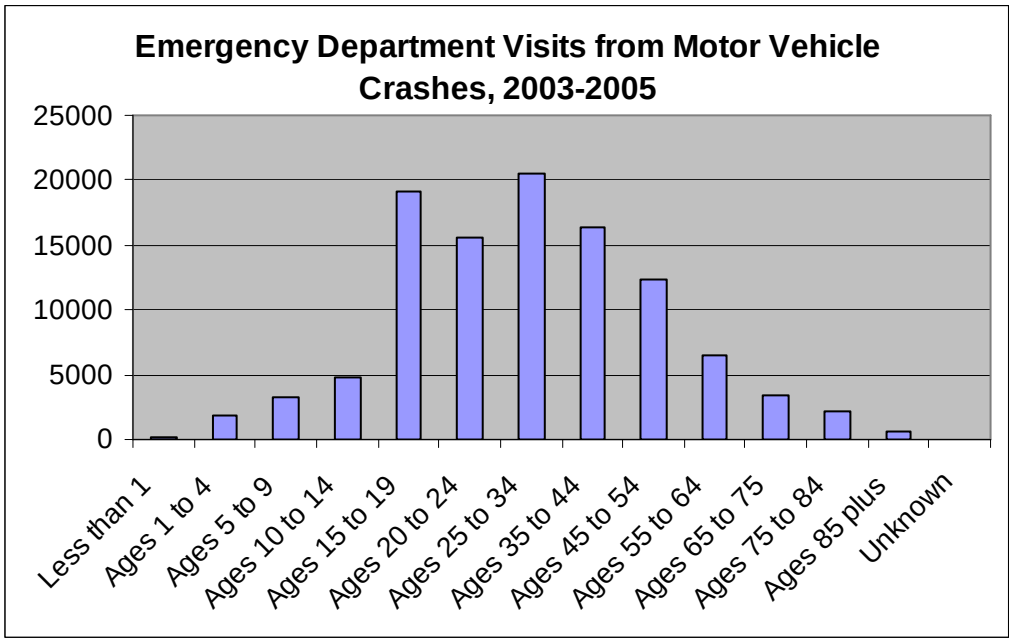
Morbidity

Emergency Department/Inpatient Data
During 2003 and 2005, there were 1,466,623 emergency department visits with a primary diagnosis for injury or poisoning (ICD-9CM codes 800-999). The ICD-9CM coding scheme includes external codes or "E" codes that indicate the source or cause of injury and are a way of coding injury-related cost data. Specific E-codes related to motor vehicle crashes include 810-819, 958.5, 968.5, and 988.5. E codes are not mandated by law in Indiana and many times are not included in the hospital discharge data. Only 44% of hospital discharge data contains E codes. Therefore, this data is accurate but is an underestimation of the actual number of motor vehicle crashes (2).

Based on data with valid E-codes, motor vehicle crashes accounted for approximately 11% of all emergency department visits during 2003 and 2005. Persons between the ages of 10 and 24 accounted for 37.1% (39,625 of 106,849) of all emergency department visits due to motor vehicle crashes (Figure 3) with the greatest percentage (45%) affected being those between the ages of 15 and 19. When discharge status was known, approximately 30% of all patients (27 of 100) who died in the emergency department following a motor vehicle crash were adolescents. The number of emergency department visits for occupants of motor vehicle crashes was second highest among 15 to 19 year olds with 16,548 visits (Figure 4). The median total charge for adolescents seen in the emergency department for motor vehicle-related injury was $648.00 (Range $0 - $40,125) as compared to the median total charge for all ages of $684.00 (Range $0 - $95,524) (2). For 2003-2005, the total charges for 10-24 year-olds injured due to motor vehicle

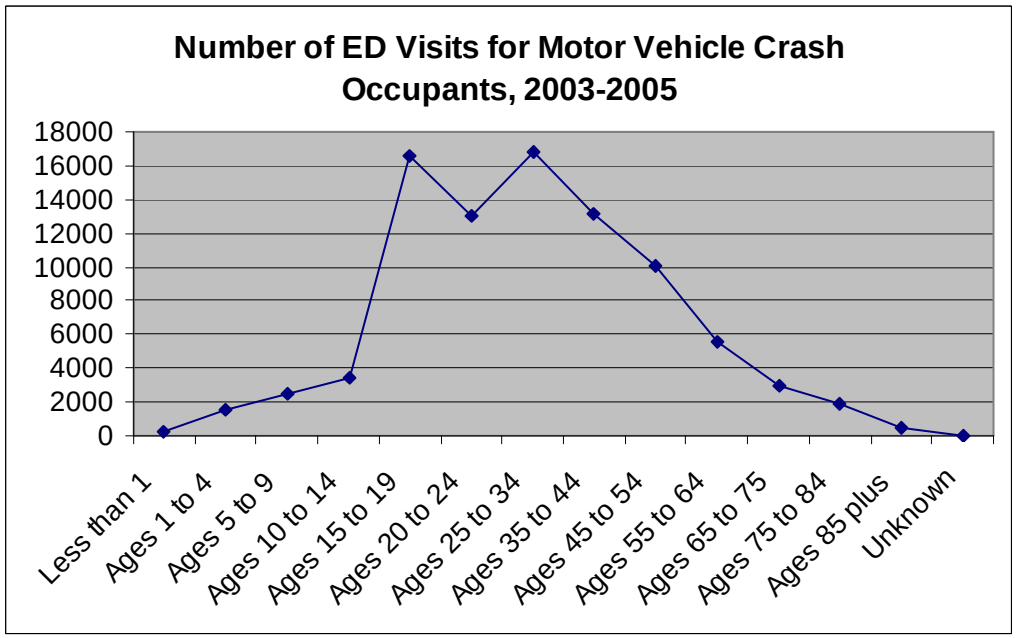
crashes who were treated in an emergency department were $49.9 million. In comparison, the total charges for all ages for motor vehicle crashes treated at emergency departments were $142.8 million.

Figure 3.



(Source: Indiana State Department of Health, Injury Prevention Program)

Figure 4.

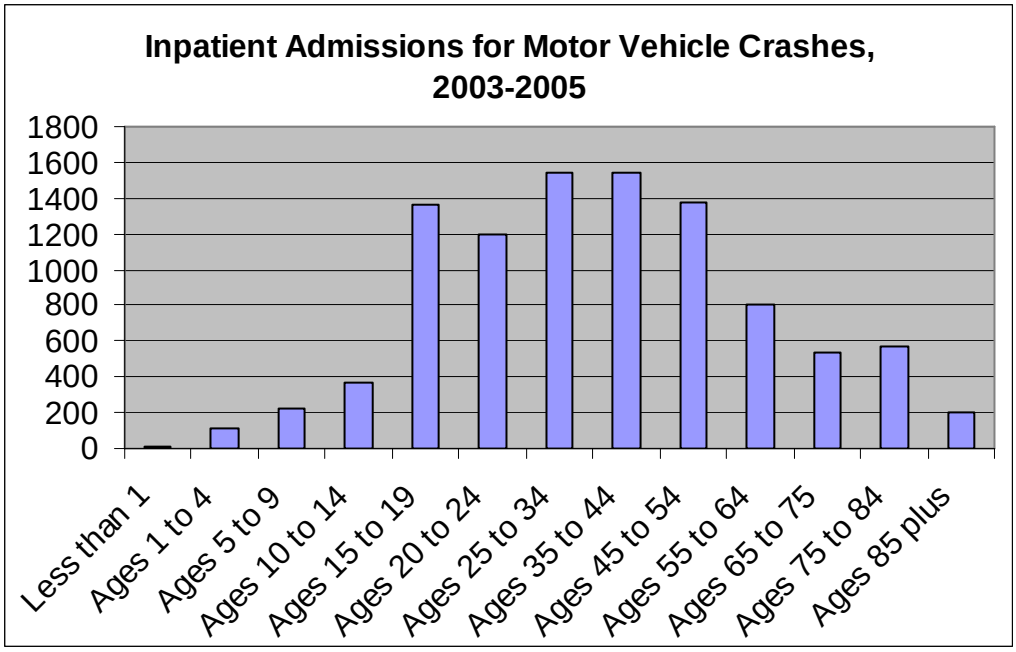


(Source: Indiana State Department of Health, Injury Prevention Program)

Inpatient Data

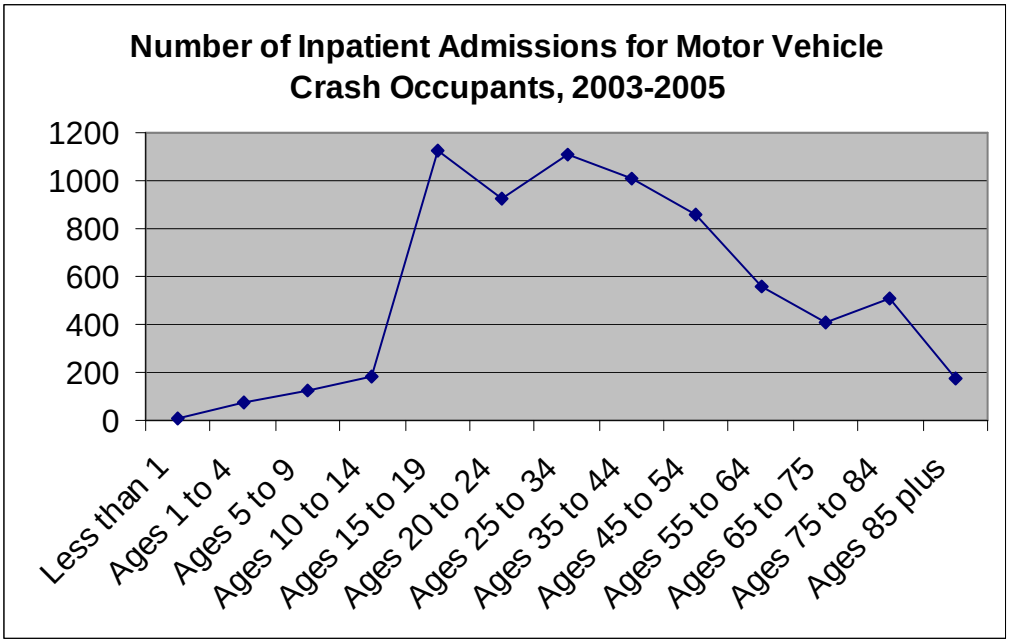
From 2003 to 2005, there were 94,266 inpatient hospitalizations with a primary diagnosis of injury or poisoning. Based on the data with valid E-codes, motor vehicle crashes accounted for approximately 14.9% of all hospital inpatient admissions. Adolescents between the ages of 10 and 24 accounted for 29.6% (2,923 of 9,859) of all inpatient hospitalizations (Figure 5) with those 15-19 years of age making up approximately 47% of all adolescents who were hospitalized. When discharge status was known, 81 adolescents (26.7%) died after admission to the hospital. Hospitalization for motor vehicle occupants was highest among 15 to 19 year olds with 1,124 admissions (Figure 6). The median total charge for adolescents injured due to motor vehicle crashes admitted to the hospital was $18,274 (Range $566 - $522,614) which is higher than the median charge for all inpatient admissions $17,796 (Range $566 - $591,543) (2). For 2003-2005, the total charges for 10-24 year-olds injured due to motor vehicle crashes and admitted to the hospital were $81.8 million. In comparison, the total charges for all ages for motor vehicle crashes involving inpatient care were $270.5 million.

Figure 5.



(Source: Indiana State Department of Health, Injury Prevention Program)

Figure 6.



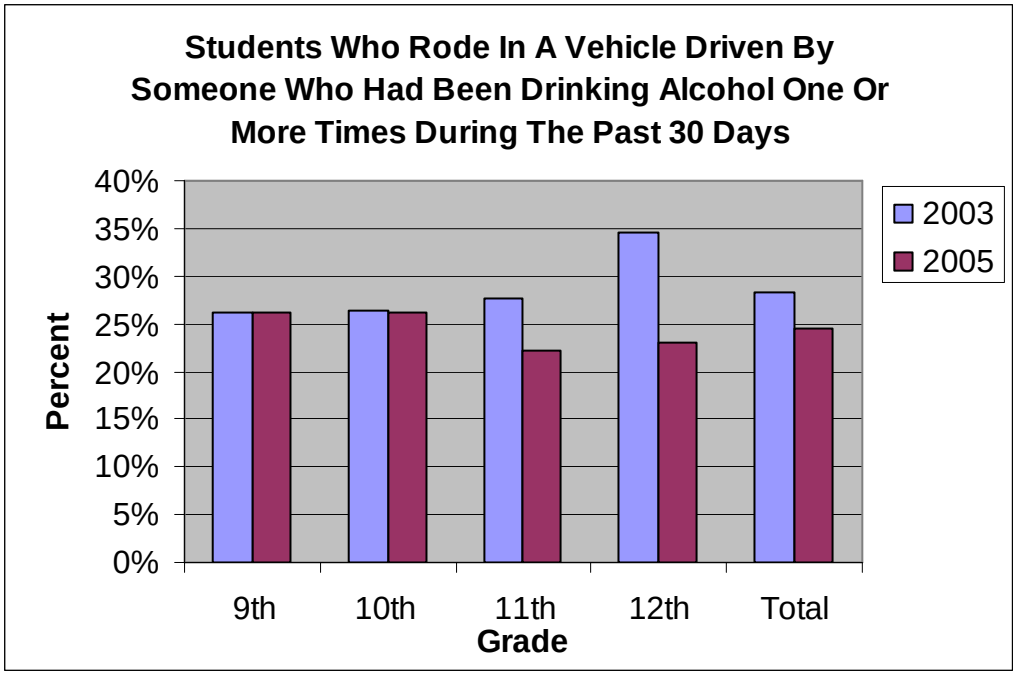
(Source: Indiana State Department of Health, Injury Prevention Program)

Risk Behaviors

Alcohol and seat belt use affect motor vehicle crashes and fatalities. Driving while under the influence of alcohol greatly increases the likelihood of an accident and failure to wear a seat belt can increase the severity of injury.

According to the 2005 Youth Behavior Risk Survey, 24.6% of high school students reported riding in a car with a driver under the influence of alcohol in the previous 30 days, which was a decrease from 2003 (28.3%) (Figure 7). When comparing years and grade levels, no pattern exists; those in grades nine and ten in 2005 had the highest percentages, and grades ten and twelve in 2003 had the highest percentages (Figure 7). In both 2003 and 2005, males were more likely to ride in a car with someone under than influence than females (Appendix B, Table 5).

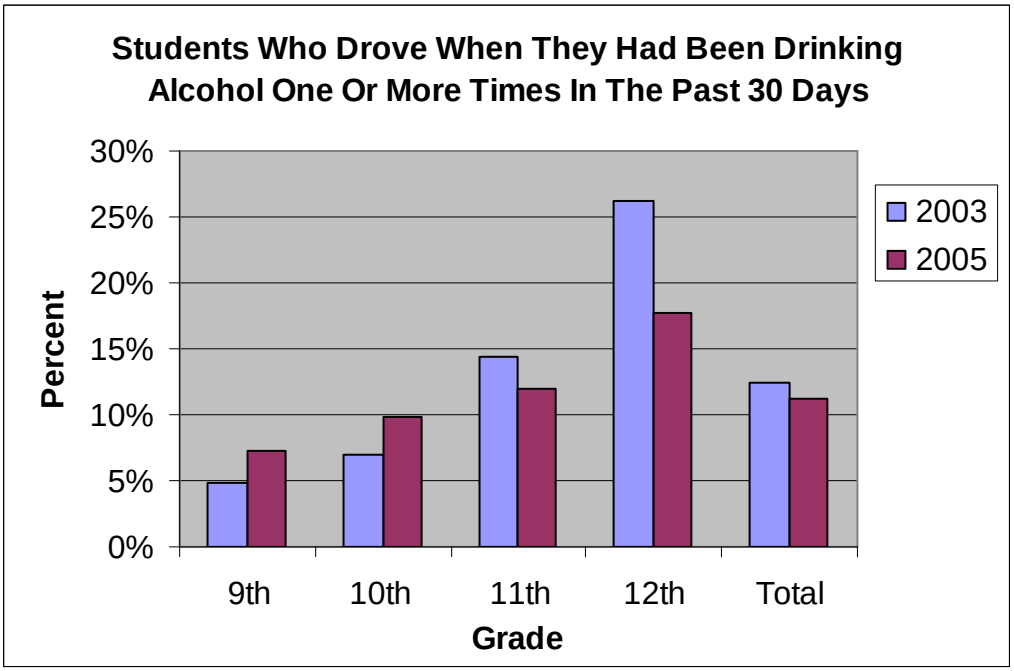
Figure 7.



(Source: Youth Risk Behavior Survey)

In 2005, 11.2% of high school students reported driving one or more times in the previous 30 days while they were under the influence of alcohol, a decrease from 2003 (12.4%) (Figure 8). Grade twelve had the highest percentage of driving while under the influence in 2005 and in 2003 (Figure 8). Males were more likely (15% in 2005 and 14.1% in 2003) to drive while drinking than females (7.3% in 2005 and 10.8% in 2003) (Appendix B, Table 6).

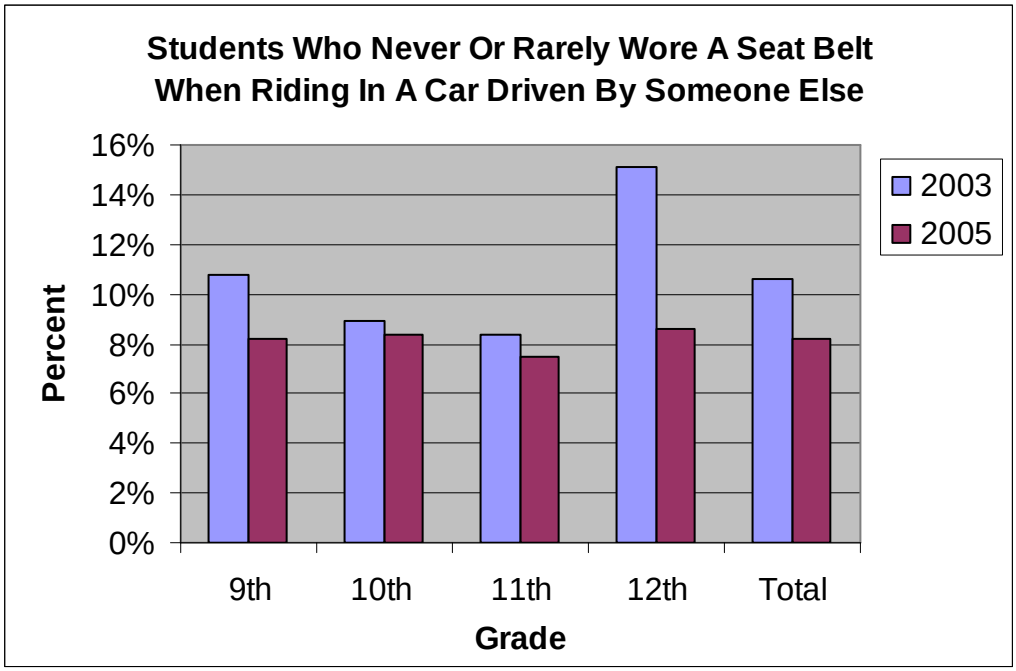
Figure 8.



(Source: Youth Risk Behavior Survey)

Using seat belts are the single most effective way to reduce fatal and nonfatal injuries in motor vehicle crashes. However, 8.2% of high school students in 2005 and 10.6% in 2003 reported never or rarely wearing a seat belt (Figure 9). Students in twelfth grade wore their seat belts less than the other three grades (Figure 9). Males were more likely to not wear their seat belt both years (12.5% in 2005 and 15% in 2003) when compared to females (3.8% in 2005 and 6.1% in 2003) (Appendix B, Table 7).

Figure 9.



(Source: Youth Risk Behavior Survey)

Prevention

Motor vehicle related injuries and fatalities are tragic and unnecessary because much can be done in the area of prevention. The systematic reviews by the Guide to Community Prevention Services (Community Guide) of the effectiveness of selected population-based interventions to reduce motor vehicle injuries and fatalities recommend focusing on three areas of prevention:

- Increasing the proper use of child safety seats
- Increasing the use of safety belts
- Reducing alcohol impaired driving

These areas were selected because child seat and safety belt usage is below the national goals, 55% of motor vehicle deaths are among occupants who were not properly restrained, and 41% of motor vehicle deaths involve alcohol. These three behaviors are modifiable and can be addressed with a variety of public health interventions. Reducing these behaviors could dramatically reduce the injuries and deaths associated with motor vehicle crashes (4).

Appendix A

When looking at the cause descriptions for the deaths, the ICD-10 codes vary slightly depending on the age category (Tables 2, 3, and 4). All age categories had the same ICD-10 codes for the two most common codes, and those 15-19 and 20-24 had all the five most common ICD-10 codes in common.

Table 2: Five Most Common ICD-10 Codes for Motor Vehicle Traffic Deaths, Indiana, 2001-2004, Ages 10-14, All Races, Both Sexes, Total Deaths: 77

ICD-10 Code	Deaths	Percent	Description
V49.9	13	16.9	Car occupant injured in other and unspecified transport accidents - Car occupant [any] injured in unspecified traffic accident
V89.2	10	13.0	Motor- or nonmotor-vehicle accident, type of vehicle unspecified - Person injured in unspecified motor-vehicle accident, traffic
V03.1	8	10.4	Pedestrian injured in collision with car, pickup truck, or van - Traffic accident
V87.7	7	9.1	Traffic accident of specified type but victim's mode of transport unknown - Person injured in collision between other specified motor vehicles (traffic)
V09.2	4	5.2	Pedestrian injured in traffic accident involving other and unspecified motor vehicles (transport)
V48.6	4	5.2	Car occupant injured in noncollision transport accident - Passenger injured in traffic accident
V86.0	4	5.2	Driver of all-terrain or other off-road motor vehicle injured in traffic accident

(Source: CDC, WISQARS)

Table 3: Five Most Common ICD-10 Codes for Motor Vehicle Traffic Deaths, Indiana, 2001-2004, Ages 15-19, All Races, Both Sexes, Total Deaths: 493

ICD-10 Code	Deaths	Percent	Description
V89.2	164	33.3	Motor- or nonmotor-vehicle accident, type of vehicle unspecified - Person injured in unspecified motor-vehicle accident, traffic
V49.9	83	16.8	Car occupant injured in other and unspecified transport accidents - Car occupant [any] injured in unspecified traffic accident
V87.7	39	7.9	Traffic accident of specified type but victim's mode of transport unknown - Person injured in collision between other specified motor vehicles (traffic)
V47.5	31	6.3	Car occupant injured in collision with fixed or stationary object - Driver injured in traffic accident
V43.5	22	4.5	Car occupant injured in collision with car, pickup truck, or van - Driver injured in traffic accident

(Source: CDC, WISQARS)

Table 4: Five Most Common ICD-10 Codes for Motor Vehicle Traffic Deaths, Indiana, 2001-2004, Ages 20-24, All Races, Both Sexes, Total Deaths: 531

ICD-10 Code	Deaths	Percent	Description
V89.2	186	35.0	Motor- or nonmotor-vehicle accident, type of vehicle unspecified - Person injured in unspecified motor-vehicle accident, traffic
V49.9	64	12.1	Car occupant injured in other and unspecified transport accidents - Car occupant [any] injured in unspecified traffic accident
V87.7	44	8.3	Traffic accident of specified type but victim's mode of transport unknown - Person injured in collision between other specified motor vehicles (traffic)
V43.5	23	4.3	Car occupant injured in collision with car, pickup truck, or van - Driver injured in traffic accident
V47.5	22	4.1	Car occupant injured in collision with fixed or stationary object - Driver injured in traffic accident

(Source: CDC, WISQARS)

Appendix B

Table 5.

INDIANA ALL YEARS
PERCENTAGE OF STUDENTS WHO RODE IN A CAR OR OTHER VEHICLE DRIVEN BY SOMEONE WHO HAD BEEN DRINKING ALCOHOL ONE OR MORE TIMES DURING THE PAST 30 DAYS
YOUTH RISK BEHAVIOR SURVEY

Year	Sex	Grade	T	9	10	11	12
2005	T		24.6 (±3.5)	26.1 (±6.1)	26.2 (±4.6)	22.3 (±4.9)	23.1 (±7.5)
	F		21.6 (±3.6)	25.4 (±6.3)	23.7 (±5.3)	17.7 (±5.1)	18.6 (±7.6)
	M		27.4 (±5.0)	26.9 (±8.1)	28.5 (±7.8)	26.7 (±6.7)	27.6 (±10.7)
2003	T		28.3 (±2.5)	26.1 (±3.3)	26.3 (±3.8)	27.6 (±4.5)	34.6 (±6.5)
	F		27.1 (±4.0)	24.3 (±3.7)	27.6 (±6.0)	24.7 (±8.6)	32.7 (±9.5)
	M		29.4 (±3.6)	27.7 (±5.0)	25.1 (±4.9)	30.2 (±9.2)	36.5 (±7.6)

Legend: **Sex T**=Total **F**=Female **M**=Male
Grade T=Total **9**=9th Grade **10**=10th Grade **11**=11th Grade **12**=12th Grade

(Source: Youth Behavior Risk Survey)

Table 6.

INDIANA ALL YEARS PERCENTAGE OF STUDENTS WHO DROVE A CAR OR OTHER VEHICLE WHEN THEY HAD BEEN DRINKING ALCOHOL ONE OR MORE TIMES DURING THE PAST 30 DAYS YOUTH RISK BEHAVIOR SURVEY							
		Grade	**T**	**9**	**10**	**11**	**12**
Year	**Sex**						
2005	T		11.2 (±2.7)	7.3 (±2.6)	9.8 (±3.5)	12.0 (±3.6)	17.7 (±7.4)
	F		7.3 (±2.4)	6.5 (±3.1)	6.5 (±4.1)	6.6 (±3.3)	10.4 (±6.9)
	M		15.0 (±3.8)	8.0 (±3.5)	13.0 (±5.6)	17.2 (±6.0)	24.9 (±9.5)
2003	T		12.4 (±2.5)	4.8 (±1.6)	7.0 (±2.3)	14.4 (±5.8)	26.2 (±7.1)
	F		10.8 (±3.8)	2.6 (±2.5)	4.7 (±3.1)	13.7 (±5.6)	24.7 (±10.8)
	M		14.1 (±2.5)	7.0 (±2.2)	9.3 (±2.7)	15.3 (±8.5)	27.6 (±7.7)
Legend:			**Sex T=**Total **F=**Female **M=**Male **Grade T=**Total **9=**9th Grade **10=**10th Grade **11=**11th Grade **12=**12th Grade				

(Source: Youth Behavior Risk Survey)

Table 7.

INDIANA ALL YEARS PERCENTAGE OF STUDENTS WHO NEVER OR RARELY WORE A SEAT BELT WHEN RIDING IN A CAR DRIVEN BY SOMEONE ELSE YOUTH RISK BEHAVIOR SURVEY							
		Grade	**T**	**9**	**10**	**11**	**12**
Year	**Sex**						
2005	T		8.2 (±1.5)	8.2 (±2.5)	8.4 (±2.8)	7.5 (±2.5)	8.6 (±4.0)
	F		3.8 (±1.5)	5.2 (±2.9)	4.0 (±3.1)	2.7 (±2.4)	3.1 (±3.0)
	M		12.5 (±2.7)	10.9 (±3.9)	12.6 (±4.9)	12.1 (±4.5)	14.0 (±6.9)
2003	T		10.6 (±2.8)	10.8 (±3.0)	8.9 (±3.3)	8.4 (±4.5)	15.1 (±6.5)
	F		6.1 (±2.8)	5.2 (±2.7)	3.9 (±2.5)	6.5 (±5.0)	9.4 (±5.9)
	M		15.0 (±3.4)	16.1 (±4.2)	13.7 (±4.8)	10.3 (±5.2)	20.7 (±10.3)
Legend:			**Sex T=**Total **F=**Female **M=**Male **Grade T=**Total **9=**9th Grade **10=**10th Grade **11=**11th Grade **12=**12th Grade				

(Source: Youth Behavior Risk Survey)

References

1. Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System (WISQARS). Available: www.cdc.gov/ncipc/wisqars.

2. Indiana State Department of Health Injury Prevention Program. Indiana Hospital Discharge Data, 2003–2005.

3. Indiana Youth Risk Behavior System Report, 2003 and 2005.

4. Centers for Disease Control and Prevention. Guide to Community Prevention Services. Available: http://www.thecommunityguide.org/.